

PR025
Project Brief
20171117

Project Description:

A multi-generational, mixed-use, flexible-configuration residence and barn, with cascaded use of thermal energy, fortified for storms and natural disasters of the future. All descriptions of site work and buildings in this proposal are a representative expression of the program, not a predetermined outcome of the anticipated design process.

Labeled Features: Old Residence, New Silo, New Barn, Breezeway, Deck, Treehouse, Helix, Trail. Please refer to the Labeled Footprint Drawing.

Named Users/Use Cases: Baker, Gardener, Sculptor.

Address:

25 Pine Ridge Road
Underhill, VT 05489

Parcel:

PR025 is a 5-acre parcel that spans Crane Brook and Browns River in Underhill Center, near and north of Underhill Town Hall. It is part of a subdivision of similar 5-acre parcels, with road access from Pine Ridge Road, a short, dead-end gravel road.

Site:

The building site is a sandy glacial deposit (perhaps "esker" or "kame"), terminating at a steep slope that descends to Crane Brook. On the far side of Crane Brook, an interval leads to Browns River.

Ample water is available onsite. Soils are consistent across the site and are considered excellent for wastewater disposal.

A dense red pine plantation once covered much of the site; recent storms have removed many trees. Hemlock, yellow birch, beech and maple species can be found amongst the pines. An old white pine dominates the eastern edge of the site. Some significant trees are shown on the site plan.

Existing Building:

The existing residence is a 1986 walkout hillside ranch with attached 2-car garage. The main mass of the building has nearly ideal passive solar orientation. Typical of the period, the house has 2x6 platform framing with fiberglass batt insulation and a truss roof with asphalt shingles. Atypically, it has a large, enclosed porch and mudroom that aid in creating zones of unconditioned space, reducing heat load. Cedar clapboard siding covers most of the house, finished in red, with white trim. Hand laid stone facade marks the main entrance. Most windows are casement type, with welded Thermopane sashes.

Program:

A PlusEnergy/energy-plus, multigenerational, flexible, durable residence and barn designed for passive survivability. Using less exotic materials and anticipating the changing needs of a multigenerational family, the buildings find their distinguishing appeal in serving different, specific use cases. For this purpose, different residents with different use cases are considered, including a “Sculptor”, “Baker” and “Gardener”, who help define energy transformation and food production onsite. Further refining the design, these residents and their use cases will each be considered with various abilities, such as endurance athletes and wheelchair users. Attention will be paid to all senses, both in terms of stimulation as possible Reversible Destiny features, and in terms of nuisance as in the noise produced by equipment in the project. The project will gracefully accommodate declining use of the private automobile. In addition to being designed for a single, multigenerational family, the project can be flexibly partitioned into multiple units. Building design, intensive gardening and regenerative landscape offer the possibility of increasing food self-sufficiency for the residents.

The project takes advantage of site characteristics to provide ramp access to three levels, and is able to transform from single family to multi-unit, with a variety of configurations and uses. It uses an energy cascade to produce biochar, cook & bake food, and provide hot water and space heat, while driving air exchange within the residence. The existing residence’s function and energy efficiency is improved with new additions. The new wing achieves PlusEnergy/energy-plus performance, while demonstrating low maintenance durability and passive survivability.

Representative Future Site Approaches:

The “Trail” aids in the transition away from automobile-oriented site design. The well-developed Trail approaches from the south, crossing Crane Brook and allowing a short and effective walking connection within Underhill Center. The Trail ascends through a stand of yellow birches and then balsam fir trees to emerge at covered bicycle parking under a canopy connecting the “Old Residence” and the “New Barn”.

A curving driveway, flanked by rising stone walls leads from Pine Ridge Rd to a courtyard between the Old Residence, a “New Silo” wing, and New Barn. The curving driveway and stone walls obscure the courtyard from the road.

A “Helix”-shaped path continues the driveway’s leftward curve, passing an underground root cellar and ice house, and returns back on itself. Having risen through the wooded knoll in the front yard to provide ADA-compliant route to the second level of the buildings, the Helix connects to the New Silo wing of the residence. This second level is a level reference plane throughout the Old Residence, New Silo and New Barn. In the reverse direction, via the town road, the Helix descends clockwise to lower level of the New Silo.

From the driveway’s junction with the road, another ADA-compliant route descends to the lower level of the New Barn, coaxial with the Trail along the west side of the site.

Representative Future Buildings:

This project is a phased project. In the likely first phase, the Old Residence receives a western addition of quiet rooms for sleeping and studying, and a second level added to meet the reference plane for wheelchair use, with a future connection to the New Barn via a deck, and future addition of the New Silo via an elevated breezeway. A wood-fired oven on the lower level provides space heat, hot water and possibly some electricity as a cascaded use of energy.

Views from the site are east and south. The axis of the "esker" divides the two and establishes routes through the residence, with exits to the southeast through a "Treehouse" that provides vertical circulation and connects indoor and outdoor space. Windows on the north and west sides of the building will be minimized.

The New Barn is a large shop, with space for making substantial sculptures. At the second level reference plane, it has a design studio that overlooks the shop floor, and is connected to the Old Residence via an elevated "Deck".

The New Silo complements the barn-like Old Residence with all-new construction for durability and storm resilience. A glass-enclosed "Breezeway" that provides genkan/mudroom access to the entire residence. Efficiency and energy production are carefully studied for the whole project and especially in this wing.

Density Bonuses:

Density bonus objectives are a useful way to measure the public good of the project, even if the bonuses are not required for permitting. The project, by significantly exceeding standards, would deserve full density bonuses for the following objectives:

9.6.A.2 Public Dedication — A trail dedication, connecting Pine Ridge Rd to Browns River, a critical link for the long-anticipated trail along Browns River. The dedication would include provisions to motivate progress on the development of the river trail.

9.6.A.4 Group Net-Metering — group net metering supplies electricity to the project and may produce a surplus for export from the site.

9.6.A.5 Building Design

a. Energy Efficient Design — The project will likely exceed NZEB:C zero energy building classification, with onsite net zero electrical energy production and wood imported to the site, setting a high benchmark for density bonus.

b. Unit Size — Flexible configuration of the units allows for each unit to be sized to fit its intended purpose.

c. Universal Design — Elevator-free access to three building levels with multiple exits makes the project uniquely accessible for mixed use. New and renovated internal space will include such features as low window sills, wide doorways, handrails and easy to use fixtures.